Filaments by E.J. O'Brien and M.J. Dickens and Myosin Molecules, Thick Filaments and the Actin-Myosin Complex by R. Craig and P. Knight) and membranes (The Proteins of the Erythrocyte Membrane by D.M. Shotton and Plasma Membrane Intercellular Junctions. Morphology and Protein Composition by C.A.L.S. Colaco and W.H. Evans). Rather more than half the book is devoted to the muscle protein systems. These review work of the last fifteen to twenty-five years. The proteins actin and tropomyosin are particularly amenable to electron-microscopic study because of their ability to form crystals, paracrystals or tactoids under a variety of conditions, such as the addition of metal ions, either on their own or in association, such as tropomyosin with troponin or whole reconstructed thin filaments comprising tropomyosin, actin and troponin. Optical diffraction patterns of these arrays which may be filtered to remove noise are then used to form images. Three-dimensional image reconstruction using Fourier methods have been used to give models of the more complex 'arrow-head' structures formed when actin or thin filaments are 'decorated' with a chymotryptic digestion fragment of myosin, known as S-1. These are fascinating structurally, and are especially important, since understanding actin, myosin and ATP interactions and their regulation forms the basis for understanding muscle contraction.

This of course requires a synthesis with results of X-ray studies of whole muscle and with a large volume of biochemical data. The X-ray approach has the advantage that time-resolved studies are possible using high-intensity synchrotron radiation, but rapid-freezing techniques may in future be applied so that successive 'snapshots' of structural changes may be possible in the electron microscope.

Membranes and intercellular junctions are rather less amenable to electron-microscopic study than muscle. Nevertheless, development of freeze-fracture and freeze-etch techniques as well as, of course, negative staining, and the use of ferritin, cationized ferritin or ferritin-conjugated concanavalin A, the extraction and examination of individual proteins and the reconstitution of membrane systems, have allowed a much more sophisticated picture of membrane structure to be built up than the simple bilayer model. Knowledge of intercellular junctions has largely been acquired through electron microscopy, although further developments in membrane biochemistry, immunology and molecular biology will, as the authors of the last chapter state, be required for understanding their fine detail.

The chapters are clearly written and well illustrated. They contain few references beyond 1981.

Pauline M. Harrison

Handbook of Tritium NMR Spectroscopy and Applications

by E.A. Evans, D.C. Warrell, J.A. Elvidge and J.R. Jones

John Wiley & Sons; Chichester, 1985

249 pages. £25.50

Tritium labelling is a well-known technique which has had widespread application in biochemistry. The usual method for detecting the label is, of course, scintillation counting. An alternative method, described in this book, is to use high-resolution nuclear magnetic resonance (NMR). NMR has the considerable advantage that the concentration of a label at a specified position on a molecule can be determined directly. The disadvantage of NMR is its lack of sensitivity, which means that very radioactive samples, of the order of mCi, are required.

This is a modest, relatively low cost book. Chapter 1 contains some basic NMR theory and the procedures necessary for safe handling of the samples. Chapter 2 describes the synthesis of and labelling patterns observed in molecules such as amino acids, carbohydrates and nucleic acids. Chapter 3 describes applications of tritium NMR. This chapter should have been the most interesting but the observation of tritium labelling by NMR has had relatively limited application so far, especially in biochemistry. Most of the studies described here have been carried out by the authors themselves. The potential of the method is, however, illustrated by the description of an investigation of the conversion of valine to cephalosporin by a suspension of *Cephalosporium acremonium* where the stereochemistry of the incorporation of the valine methyl groups could be determined directly.

In general, the NMR methodology described is rather primitive by today's standards, where two-dimensional techniques at very high fields are routinely used. Much of chapter 2, which contains tables of chemical shifts and the observed distribution of tritium in molecules prepared by different methods, seems to be superfluous since the shifts of tritium are the same as the hydrogen shifts, which are well known, and the distribution patterns will vary. It should also be pointed out that the stable isotopes, ^{2}H, ^{13}C, and ^{15}N, are very useful NMR labels. Since these are readily available and safe to handle, most experimenters prefer to use them, where possible. In contrast to the applications of tritium NMR, the biochemical literature has many sophisticated applications of NMR involving the observation of stable isotopes. There is, however, no competitor to this book, to my knowledge. It does offer a collection of useful references and a place to begin should one wish to do a tritium NMR experiment.

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